REPORT NO. 84-2-20
ALEXANDRIA FIELD OFFICE

3430
MAY 1984

HAZARD RATING AND CONTROL ALTERNATIVES FOR THE SOUTHERN PINE BEETLE ON THE PROPOSED WILDERNESS AREAS ON THE NATIONAL FORESTS IN TEXAS

by

Wesley A. Nettleton and James D. Smith[1/]

INTRODUCTION

The southern pine beetle (SPB), Dendroctonus frontalis Zimm., is the most destructive insect pest of pine on the National Forests in Texas. The factors contributing most to host susceptibility are reduced tree vigor and tree stress. This is evidenced by consistent SPB association with reduced radial growth and stand disturbance.

Most outbreaks are short in duration, 2 to 3 years, with a major epidemic occurring every 10 years. This has led to the belief that the beetle is cyclic in nature, but in local areas activity fluctuates significantly. In east Texas for the 20 year period from 1958 to 1977 there was a continuous outbreak that peaked in 1976 with almost 11,000 spots with 10 or more trees per spot (Texas Forest Service 1978). In 1982 the number of infestations again started increasing with the majority of activity on the National Forests. SPB populations reached epidemic levels on all Ranger Districts in 1983 with the Four Notch Further Study Area on the Sam Houston National Forest being the focal point. In this 6,200 acre tract approximately 17,000 MBF of timber were killed with the largest spot reaching more than 2,000 acres in size.

Changes in the forest structure in east Texas appear to be correlated with increase in beetle infestation levels (Hedden, 1978). The epidemic that occurred in the early to mid 1970's was centered in southeast Texas where

---

1/ Entomologists, USDA Forest Service, Southern Region, State and Private Forestry, Forest Pest Management, Alexandria Field Office, Pineville, LA.

there were large contiguous acreages of old growth pine sawtimber owned by industry. This overabundance of host type combined with susceptible stand conditions led to a large SPB population buildup. Since that time, forest industry has liquidated much of their inventory of pine sawtimber and is now managing on a shorter pulpwood rotation (Billings 1984). This leaves the National Forests as the major area of old growth sawtimber. Not surprisingly, 84% of the Texas Forest Service's high SPB hazard grid blocks occur over federal land (Texas Forest Service, unpublished data). This combined with management constraints leads to the conclusion that the National Forests in Texas are going to continue to have SPB problems for some time to come.

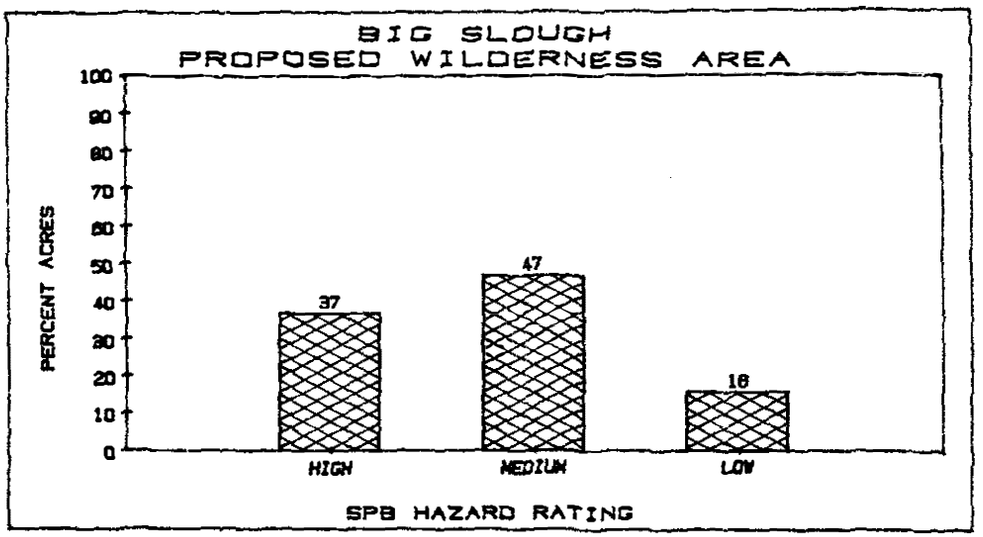
Due to the current high SPB population levels and concern that large timber loss may occur, Forest Pest Management has analyzed the potential SPB hazard in the Turkey Hill, Inland Island, Big Slough, Little Lake Creek and Indian Mounds Proposed Wilderness Areas. These areas are all included in the 1984 Texas Wilderness Act - Bill HR 3788.

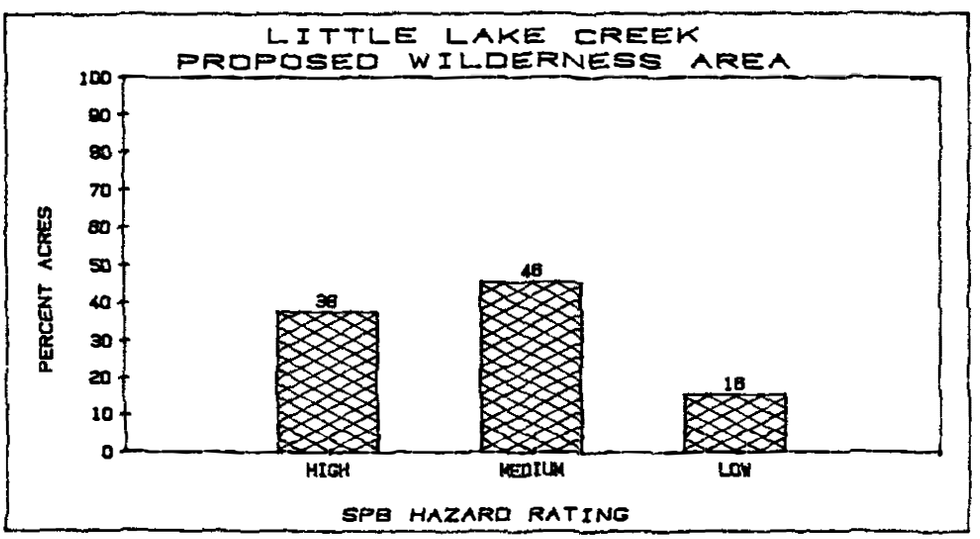
HAZARD RATING

The five proposed wilderness areas were hazard rated to get an indication of where SPB outbreaks can be expected to develop, and if they do, where resource losses and beetle reproduction are likely to be greatest. The system used is called National Forest Risk (Lorio and Sommers, 1981). It utilizes Continuous Inventory of Stand Conditions, an automatic data processing system used by the National Forests in the Southern Region to inventory and manage timber stands, and assigns a rating of high, medium or low hazard to each stand.

The percentage of pine type acres in each hazard rating class was determined and is summarized in figures 1 and 2. All areas contained more than 60 percent of their acres in high and medium hazard classes. This indicates that when SPB infestations occur in these areas, they will be more frequent, cause greater loss of resource, and produce more beetles than stands that are younger and managed for vigorous growth. This fact is reinforced by figures 3 and 4 which show the comparison of each of the proposed wilderness areas to the entire Ranger District. These percentages are based on total regulated acres which includes all forest types. With the exception of the Big Slough, the proposed wilderness areas are much more likely to have SPB losses than the managed Ranger District land.

The probability of SPB infestation (risk) and the potential for resource loss (hazard) can be used together to estimate future SPB problems for forest stands. This has been accomplished by combining Texas Forest Service Grid Hazard (Billings and Bryant, 1983), a large area hazard rating system designed to hazard rate 18,000 acre units based on photo-interpreted stand and landform variables, with a SPB population factor (based on the number of spots detected in the past two years) to assign a "risk rating" value to each grid block (Table 1). Most of the





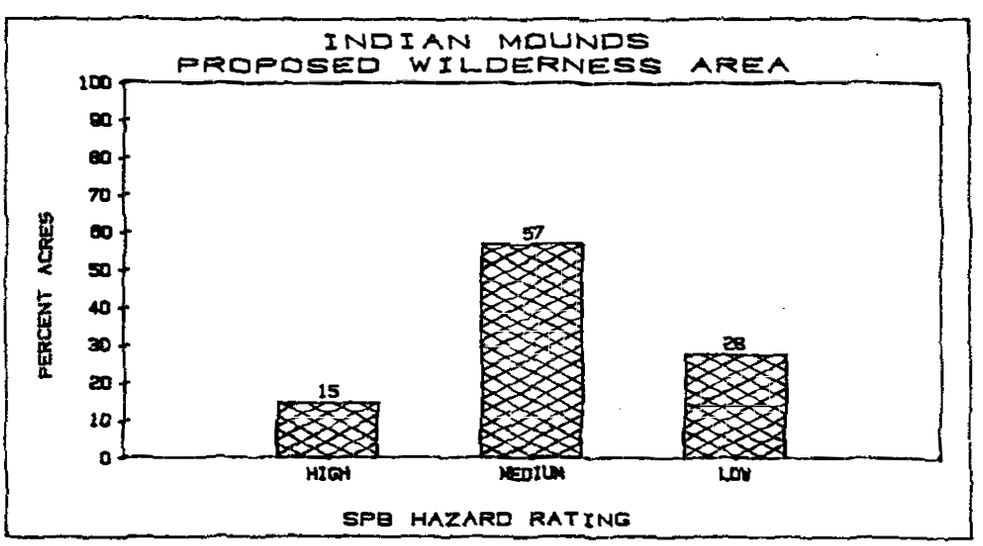
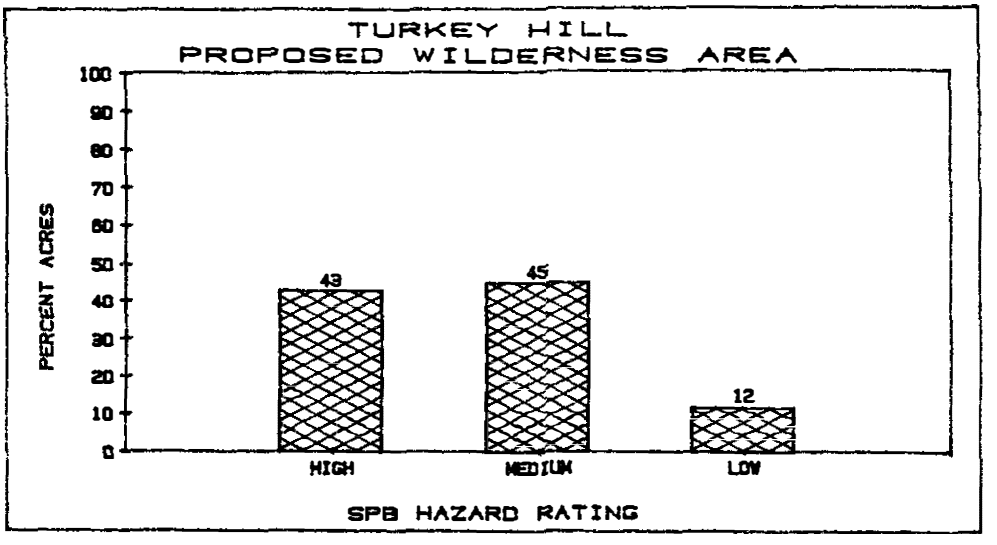


Figure 1. Percentage of pine type acres in the proposed wilderness areas on the National Forests in Texas by SPB hazard class, June 1984.



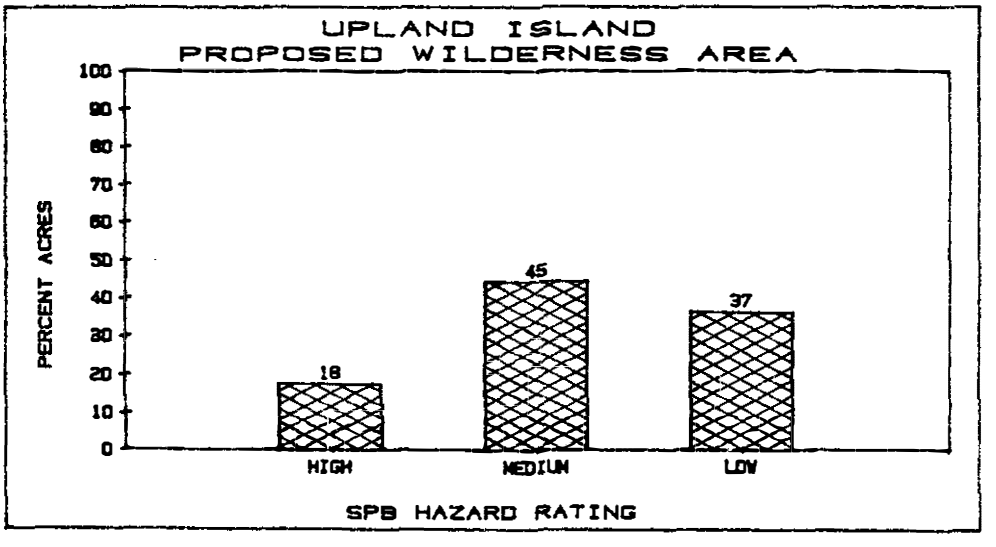
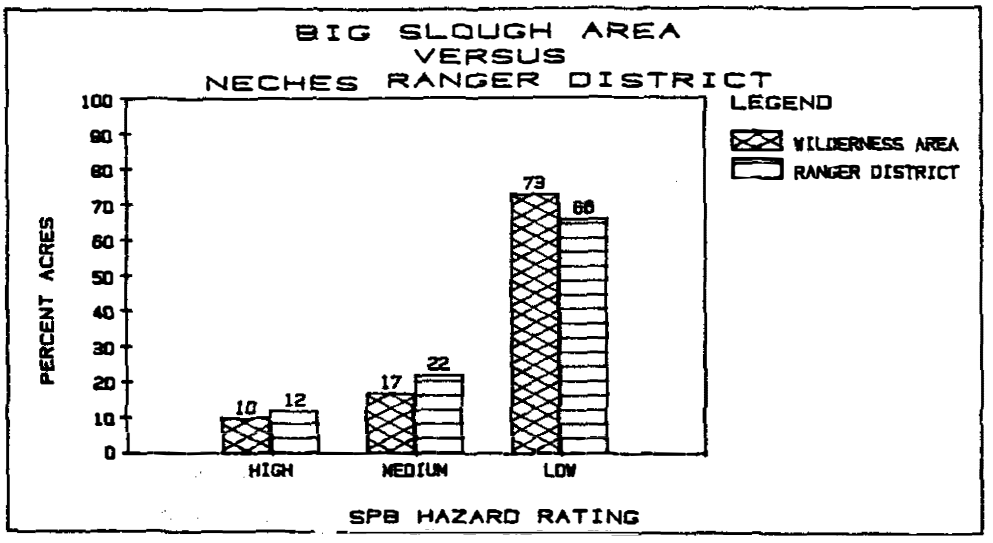
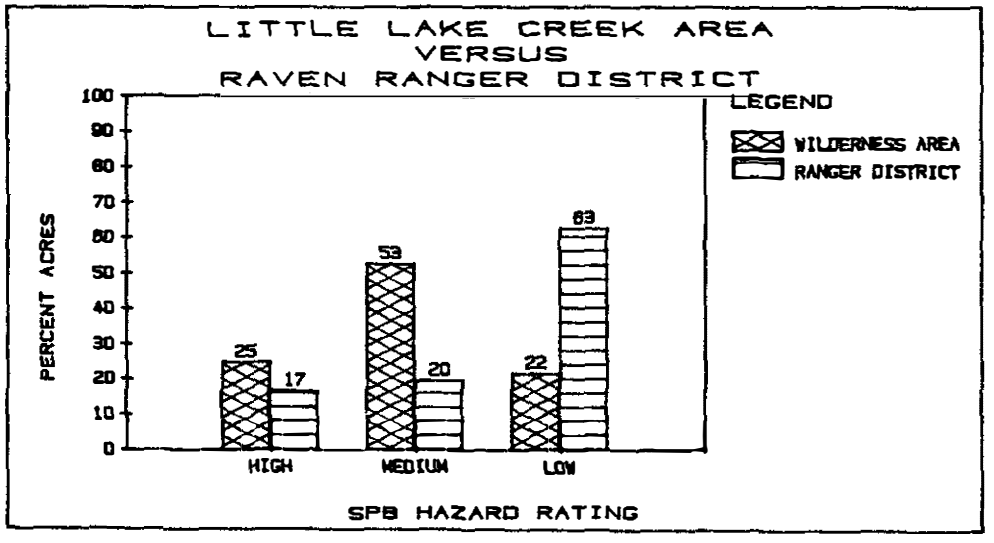


Figure 2. Percentage of pine type acres in the proposed wilderness areas on the National Forests in Texas by SPB hazard class, June 1984.





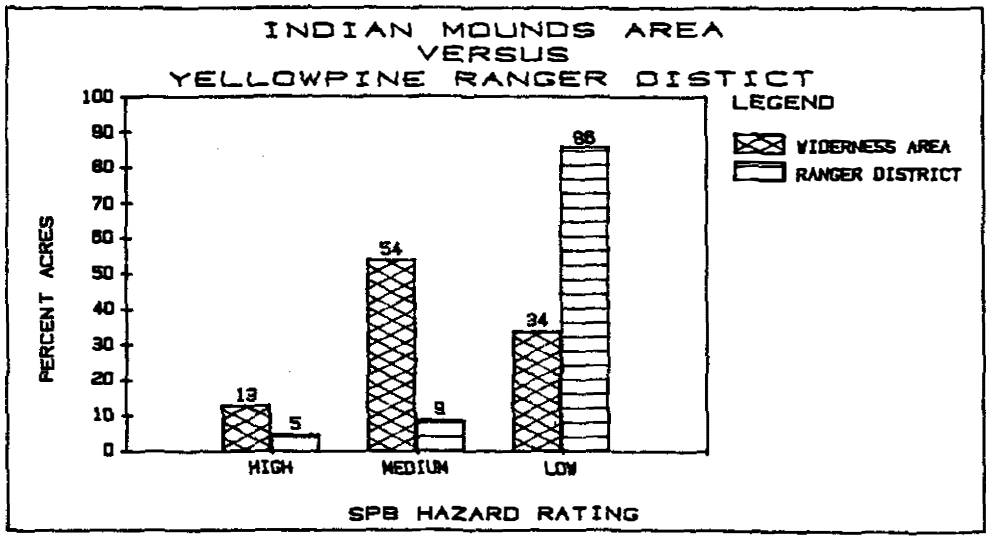
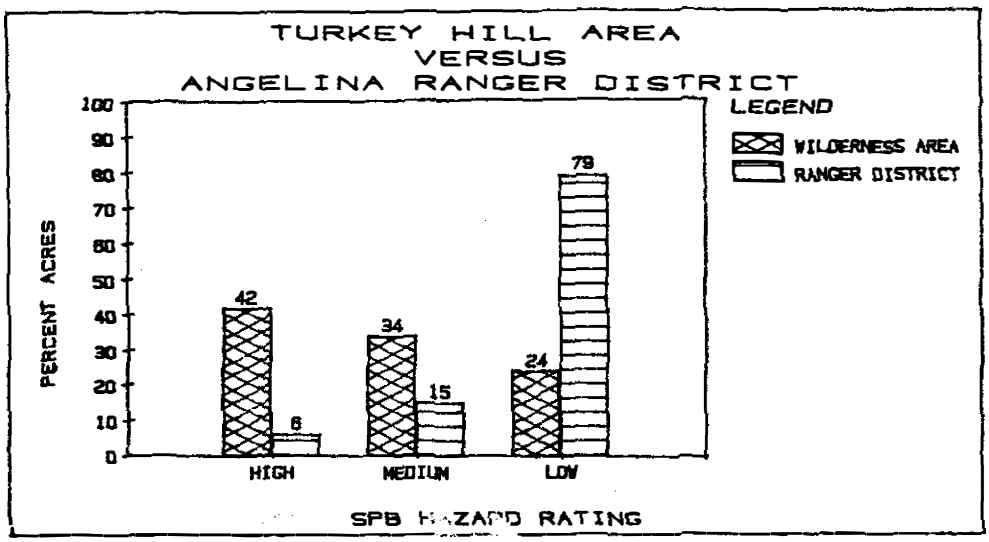


Figure 3. Comparison of percentage of total regulated acres on the proposed wilderness areas to the Ranger Districts within which the areas are located by SPB hazard class, June 1984.



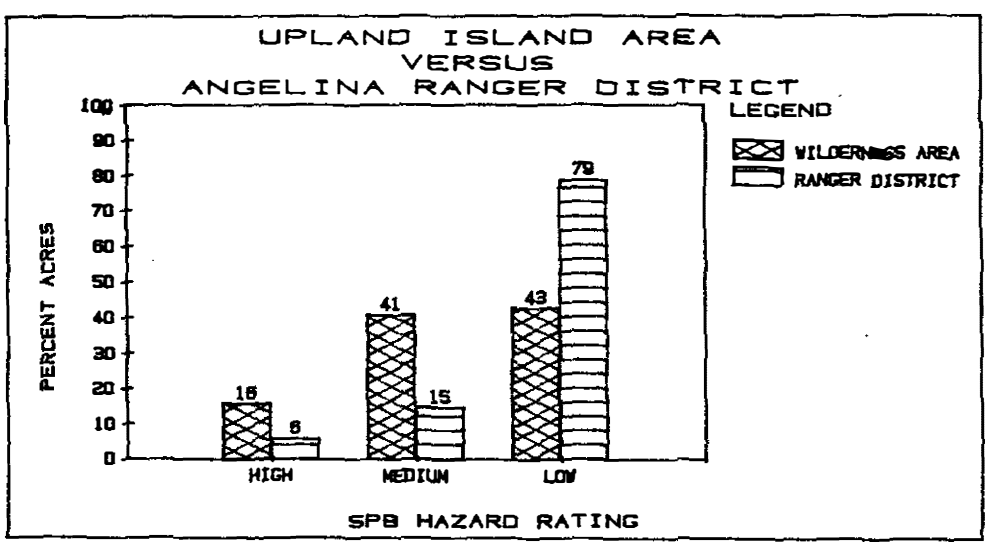


Figure 4. Comparison of percentage of total regulated acres on the proposed wilderness areas to the Ranger Districts within which the areas are located by SPB hazard class, June 1984.

Table 1. Listing of TFS grid blocks within proposed wilderness areas (PWA) in Texas, with reference to hazard and risk for southern pine beetle infestations:

Proposed Wilderness Area	Grid Block	Approximate % of PWA	SPB Hazard(1)	SPB Risk(2)
Little Lake Creek	316	75%	High	High
	266	21%	High	High
	265	4%	High	Moderate
Graham Creek/Upland Island	882	47%	Low	Low
	832	39%	High	Moderate
	833	9%	High	High
	883	5%	Moderate	Moderate
Big Slough	623	75%	Moderate	High
	573	25%	Low	Moderate
Turkey Hill	684	89%	High	Extreme
	685	11%	Low	Moderate
Indian Mounds	690	38%	Low	Moderate
	689	27%	Moderate	High
	740	18%	Low	Moderate
	739	17%	Moderate	High
	738	Adjacent	High	Extreme
	789	Adjacent	High	Extreme

(1) Based from an analysis of pine host abundance and suitability for SPB infestations, derived from recent aerial photographs.

(2) Based on a combination of hazard class and 1982-83 southern pine beetle activity.

SPB activity in 1984 is expected to be concentrated in those grid blocks rated as moderate, high, or extreme risk.

DIRECT CONTROL ALTERNATIVES

Control of the SPB in proposed wilderness areas is usually approached by protecting managed timber stands which are near the infestations in question. Also, the wilderness characteristics of the area as it is defined by the presence of southern yellow pine trees may be protected by timely control of the SPB. When SPB infestations are detected on proposed wilderness areas in Texas, Forest Pest Management will provide a biological evaluation to determine the extent of the problem. If conditions are such that a decision is made to control the SPB infestation, several control techniques are available. Salvage, chemical control, cut-and-leave, and pile-and-burn techniques are proven methods of controlling the growth and spread of individual SPB infestations.

Alternative 1 - No Action. Under this alternative, it is expected that the SPB infestation would continue to spread and destroy many of the aesthetic characteristics for which these proposed wilderness areas were selected. If unchecked, the beetles would create large openings of dead snags and scrub brush and greatly reduce the overall pine component. Infestations would likely spread to adjacent areas of both public and private land or serve as epicenters for population expansion. Liabilities for damage could be involved.

Standing snags create a safety hazard to visitors to the areas.

Alternative 2 - Removal of infested trees and buffer strip of uninfested trees by commercial sales. When infested and buffer strip trees of merchantable size are accessible (skidding distance is a quarter of a mile or less to a road), they could be removed by commercial sale. Logging of the infested material should begin immediately. Where needed a buffer strip usually equal in width to the average height of the trees in the stand will be marked and cut adjacent to and ahead of the most recently infested trees. The order of priority for removing infested timber will be as follows:

a. Trees in the buffer zone. A buffer strip (at least equal to the average height of the trees in the stand) of uninfested green trees around the head of the spot is recommended for removal to minimize reinfestations and to disperse the beetles. With weekly monitoring of the spot after control, the buffer strip could be made smaller.

b. Infested green trees. This removes the SPB pheromone source and potential brood.

c. Faders. This removes potential brood.

d. Red-topped. These trees contain living brood during fall and winter and should be removed. It is not necessary to remove these trees during the warmer summer months when developmental rates are much faster.

Alternative 3 - Chemical Control. Chemicals recommended for SPB are Lindane and Dursban. Formulation mixtures are shown on labels. Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A hand compressed air sprayer is an ideal applicator. Infested logs should be turned three times to insure complete treatment of infested bark.

Trees containing advanced broods (late larvae, pupae, adults) should be treated first. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts", every effort will be made to locate and treat all green infested trees during the chemical control operation.

Trees from which the brood have emerged should not be sprayed so that natural enemies of the SPB can complete their development. Also, do not spray stumps of infested trees that have been felled.

Alternative 4 - Cut-and-Leave. Cut-and-leave is designed to disrupt spot growth in inaccessable or unsaleable spots by dispersing emerging beetles. The following procedure is to be followed when cut-and-leave is applied.

(1) Identify all active trees within the spot.

(2) Fell all active trees toward the center of the spot.

(3) Fell a horseshoe-shaped buffer strip of green, uninfested trees around the most recently attacked trees at the head of the spot and leave them lying on the ground with crowns pointed toward the center of the spot. Normally, the buffer should be as wide as the average height of the trees in the spot. (Extremely active and rapidly expanding spots will require a wider buffer. Professional entomologists expertise will be required.)

(4) Dead trees from which all SPB have emerged need not be felled. Cut-and-leave treatments, for best results, should be applied during the summer months only (June-October).

Each spot (> 50 active trees) treated must be checked at one week intervals for 4 weeks and treated again, if necessary. Smaller spots (< 50 active trees) need to be checked one time, three weeks after treatment to assure no breakouts have occurred.

Alternative 5 - Pile-and-Burn. Felling, piling, and thoroughly burning the bark of infested trees is one of the oldest methods of controlling SPB. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling and burning

infested trees, particularly in large spots, is the same as stated above under removal of infested trees by commercial sale. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts", every effort will be made to locate and treat all green infested trees during the piling and burning operation. Burning should not be done if it will result in soil erosion.

RECOMMENDATIONS

Based on the SPB hazard and risk rating values determined for the Big Slough, Little Lake Creek, Indian Mounds, Turkey Hill and Upland Island Proposed Wilderness Areas it can be projected that SPB losses will be significant during 1984 and future years. Since forest management alternatives to reduce the number of acres in high and medium hazard classes, such as thinning or regenerating overmature pine stands, are not available, Forest Pest Management recommends that the proposed areas be monitored intensively. If SPB infestations are detected a biological evaluation will be performed promptly by FPM entomologists and appropriate control recommendations made.

LITERATURE CITED

Billings, R.F. Forest pests in east Texas: past approaches, future challenges. In: History, status, and future needs for entomology research in southern forests: Proceedings 10th Annual East Texas For. Ent. Seminar. Texas A&M MP 1553; 1984:1-5.

Billings, R.L.; Bryant, V., C.M. Developing a system for mapping the abundance and distribution of SPB habitats in east Texas. In: Proceedings, Symposium on Insect and Host Tree Interactions. 1983 March 29-31; Frieburg, West Germany. Zeit. agnew. Entomol. 96(2): 208-216; 1983.

Hedden, R.L. The need for intensive forest management to reduce southern pine beetle activity in east Texas. South. J. Appl. For. 2: 9-22; 1978.

Lorio, P.L., Jr.; Sommers, R.A. Use of available resource data to rate stands for southern pine beetle risk. In: Hazard rating systems in forest insect pest management; Symposium proceedings. Gen. Tech. Rep. WO-27. Washington, D.C.: U.S. Department of Agriculture, Forest Service; 1981: 75-78.

Texas Forest Service, Texas forest pest activity 1976-1977 and Forest Pest Control Section biennial report. Texas Forest Service, College Station, TX; 1978. 28p.

REPORT NO. 84-2-20 3430
ALEXANDRIA FIELD OFFICE MAY 1984

HAZARD RATING AND CONTROL ALTERNATIVES FOR THE SOUTHERN PINE BEETLE ON THE PROPOSED WILDERNESS AREAS ON THE NATIONAL FORESTS IN TEXAS

Prepared by: Wesley G. Nettleton
Entomologist

James L. Smith
Entomologist

Approved by: for HARVEY V. TOKO
Staff Director
Forest Pest Management

SOUTHERN REGION, STATE AND PRIVATE FORESTRY
USDA, FOREST SERVICE, ATLANTA, GA 30367